Surface Matters
What Arizonans are doing with geospatial technology
Newsletter of the Arizona Geographic Information Council

Updates from the Private Sector

AGIC, due to its nature as an advisory board under the Office of the Governor, is populated with people from different levels of government. Likewise the participation on AGIC committees, and attendance at the yearly conference, are mostly by government people as well. However, much geospatial activity goes on in the private world and it should not be overlooked. Here, then, are a few updates from companies that work all across Arizona.

Growth Modeling

TerraSystems Southwest, Inc. in Tucson is developing spatial growth modeling software on a project-by-project basis for the Prescott College Sustainability & Science Impact Center. This software allows Center staff to develop future land use maps based on the amount of population and job growth expected, the distribution of that growth among user-defined land use types, locally-defined vacant land areas and spatially-defined growth preferences of the local community. This software is currently being applied in Yavapai County as part of a larger analysis of water demand and supply.

MCDOT Scalloped Streets Project

Dibble Engineering

This Maricopa County Department of Transportation (MCDOT) project is aimed at identifying and prioritizing segments of scalloped streets within the southeast valley of Maricopa County for widening improvements. Scalloped streets can create bottlenecks, add congestion, and slow down traffic since they do not have the capacity to meet current traffic demands. The evaluation of scalloped streets was accomplished using GIS and project prioritization was performed using Microsoft Access. The project area is bounded by Hunt Highway to the south, I-10 to the west, Salt River to the north, and Meridian Road to the east. Within the study area, over 130 miles of scalloped streets exist, including over 104 miles of arterial streets, and 26 miles of collector streets. Of these total 130 miles, 15.8 miles are classified as high priority for improvements due to accident history, traffic congestion, and safety concerns. About 44.6 miles have a medium priority while 69.7 miles have a low priority. The estimated total cost of improvement is $635.5 million.

Creation of a GIS for the Ponderosa Park Domestic Water Improvement District (PPDWID)

Shephard-Wesnitzer was pleased to create a small GIS using their existing drawings for this 1 square-mile area just south of Prescott, Arizona earlier this year. The goal was to bring together all available paper and digital data into one system, to be viewed on a desktop computer, and have the data accessible for other applications in the future. A low-distortion coordinate system was applied to use existing survey control, Yavapai County GIS layers, and tied together scanned as-built drawings and any engineering data. The project lasted about two months and involved our registered land surveyor, our GIS professional, and two of the PPDWID staff for project coordination and review of data for adjustments and corrections.

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INSIDE THIS ISSUE

GIS and Surveying: Defining Geospatial Data and Practice

Tim Smothers
Gene Trobia

Editor's note: In recent years, as spatial technologies have become more accurate, the distinction between surveying and GIS practice has become blurred. Because surveyors must be registered and carry legal responsibility for the data they produce, while GIS professionals do not, this blurring line has caused confusion, rancor, and various legal proceedings across the country. The article below presents the views of two members of the AGIC Board as Arizona grapples with this issue.

The past several months have brought forth a change in the proverbial weather with respect to GIS operations throughout Arizona and even the nation. At all levels of government we have seen organizations and individuals looking to define geospatial practices. As one example, the Management Association for Private Photogrammetric Surveyors (MAPPS) has brought suit against the Federal government to ensure qualifications-based selection for mapping and surveying projects as defined by the Brooks Act of 1972. At the more local level a letter of concern was recently delivered to the Arizona State Board of Technical Registration regarding the collection of GIS data using GPS equipment, and then relating this practice to a strict interpretation of Arizona statute with regard to the practice of surveying (see ARS 32-101.22.D). Both of these activities have implications for the practice of GIS and mapping services within our state. AGIC is currently working with the Arizona Professional Land Surveyors Association (APLS) to develop adequate definitions regarding the practice of surveying as opposed to the practice of GIS or mapping services. Agreement is across the board that both surveying and GIS activities share common traits, however, we are currently researching and debating opportunities to adequately define both the similarities and the clear differences as to when geospatial data should be developed by a surveyor and when that may not be necessary.

A key to our predicament is technology. In the past, technology (namely bandwidth) did not provide ample means to share localized information at regional scales. Today, many of these barriers have been breached, and a primary goal of AGIC is to provide a conduit for the *proper* dissemination of geospatial information throughout the state. Our target audience is state and local governments that require geospatial data both inside and outside of their responsibility or purview – making the data easy to obtain, seamless to use, and identified properly with respect its limitations. As Steve Whitney (GIS Manager for Pima County) states, "It's all about the data." As GIS managers, it is paramount that everyone understand this motto. As geospatial data become more integrated into the business of government, it is imperative that geospatial professionals develop data and information under specific guidelines (in the event they become a shared resource). They also need to serve these data

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Private Sector Updates

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ESRI ArcGIS software was used to incorporate survey control and existing GIS data, and to import AutoCAD drawings and georeferenced, scanned as-built drawings for on-screen digitizing. This was a jump-start GIS project for the district, paid in part with WIFA grant money, and allowed the district to assemble a quick inventory and replacement schedule for its facilities while providing quick and easy mapping on a variety of media and platforms.

Getting the Most out of Manholes: Multiple Uses for a High-Accuracy Sewer Manhole GIS Inventory

Geodetic Analysis, LLC is working with the City of Safford on a high-accuracy inventory of sewer manholes for the city's GIS. There are two main objectives: 1) Provide accurate elevations for hydraulic modeling of the sewer system, and 2) Assess the accuracy of recently completed aerial mapping. All accuracies are reported at 95% confidence per the Federal Geographic Data Committee *Geospatial Positioning Accuracy Standards*, and they will be integrated into the city's GIS as feature-level metadata.

In a single night, 644 manholes were surveyed using six survey-grade GPS rovers and three bases to obtain 2856 real-time and post-processed vector ties, which were least-squares adjusted to determine manhole positions (about 200-300 manholes remain to be surveyed). Of these 644 manholes, 82 were observed at least twice at different times by different operators. Based on the network adjusted survey results, the overall accuracy of the manhole positions is within approximately ±0.1 foot horizontally and vertically. Comparing these surveyed positions to 434 aerially mapped manholes indicates aerial mapping accuracies of ±0.7 foot horizontally and ±0.6 foot vertically (per the FGDC National Standard for Spatial Data Accuracy). The City intends to continue using these manholes for evaluating the accuracy of all future aerial mapping.

Tackling A Town's GIS Challenges

The Tempe office of international engineering services firm AMEC is in the midst of an ambitious undertaking that will enable the GIS program of one of the fastest growing communities in Arizona to keep pace with the needs of its citizens.

The population of the Town of Queen Creek has more than quadrupled from 4,316 in 2000 to nearly 20,000 today. The explosive growth is placing more and more demands on the GIS staff and resources of a town that has earned a reputation for innovation, community outreach and leadership.

"The town needs to have visual access to all of the things it governs to run efficiently and effectively," says Brian Sovik of AMEC. "GIS is in the middle of everything – from infrastructure such as roads and utilities to annexation and property development issues."

AMEC began the development of a five-year GIS Strategic Plan by interviewing GIS users in the town's Planning, Economic Development, Public Works, Parks and Recreation, Public Safety and Public Information departments. The information will be used to write a GAP analysis, a phased implementation plan of improvements, and budget and staffing recommendations to support the plan.

"Some improvements, such as a deployable desktop application and integration of databases, might be suggested for the near term, while others such as making the information available on the Internet may be more long-term goals," Sovik says. ◇

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using practical, repeatable, and reasonable methods. "Protecting the public" is the motto of APLS with regard to the practice of surveying – this motto must also be true as we geospatial professionals provide spatial information for decision making.

In an attempt to identify the differences between the practice of surveying and "other" geospatial activities, the National Council of Examiners for Engineering and Surveying (NCEES) developed Model Law and Model Rules documents.

Upon review of these documents, put together by various professionals across the country, it might be wise to use this information in the development of recommendations for the classification of information as it exists between surveying and GIS data. Under the NCEES Model Rules (210.25) the key to the practice of surveying has been the identification of Authoritative Record. If the data are to be used as an authoritative boundary, then this is under the purview of surveying. The key to our quest would then be the definition of what constitutes an authoritative record, and relate this information to Arizona and its own statutes. If we look to other states to see how they've dealt with similar issues we can find different extremes of integration. South Carolina has now "registered" GIS professionals through licensure and provided geospatial professionals a certain amount of "authority" via a focus on the person (http://www.scstatehouse.net/coderegs/c049.htm - 49-201). Oregon, in another effort, has taken portions of the NCEES laws and rules and incorporated them into their own statutes. They attempted to clearly define the differences between the practice of surveying and "not-surveying" (see the January / February URISA Newsletter for information regarding this activity). When all is said and done, the efforts of Arizona may fall somewhere in the middle, working on both *data* and *people* (two of the five spokes of GIS implementation). Whatever the outcome of our efforts, it is imperative that geospatial professionals of all levels become involved, have a voice and work with the survey community to properly communicate and collaborate, as appropriate, in our efforts. As we all understand

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that GIS is much more than a digital representation of points and lines, we should all understand that surveying is much more than the development of legal descriptions. Understanding the *use* of information is a major key to properly representing and applying the power of place.

Please join us at the AGIC Conference in Prescott, August 8-10, where this and much more information will be presented regarding these topics. Members from your AGIC Board and APLS will be giving talks regarding these activities, as well as talks on protecting the public, data collection standards, and other great topics. ◇

Further Information

Arizona State Board of Technical Registration
www.btr.state.az.us

Arizona Professional Land Surveyors Association
www.azpls.org/

Management Association for Private Photogrammetric Surveyors
www.mapps.org

National Council of Examiners for Engineering and Surveying
www.ncees.org

NCEES Model Law:
www.ncees.org/introduction/about_ncees/ncees_model_law.pdf

NCEES Model Rules:
www.ncees.org/introduction/about_ncees/ncees_model_rules.pdf

Urban and Regional Information Systems Association
www.urisa.org

URISA Newsletter, January/February 2007
http://www.urisa.org/files/janfeb.pdf

South Carolina Code of Regulations for Engineers and Surveyors
http://www.scstatehouse.net/coderegs/c049.htm

Oregon's Checklist for Defining Geospatial Practices

Oregon State Board of Examiners for Engineering and Land Surveying

From the URISA Newsletter, January-February 2007

1. Does it provide or offer to provide professional services that apply mathematics, geodesy and other sciences and involve the making of geometric measurements and gathering of related information pertaining to the physical or legal features of the earth?
2. Does it provide or offer to provide professional services that apply mathematics, geodesy and other sciences and involve the making of geometric measurements and gathering of related information pertaining to improvements on the earth?
3. Does it provide or offer to provide professional services that apply mathematics, geodesy and other sciences and involve the making of geometric measurements and gathering of related information pertaining to the space above or below the earth?
4. Does it provide or offer to provide professional services that apply mathematics, geodesy and other sciences and involve the development of measurements and information described in questions 1 through 3 above into graphics, data, maps, plans, reports, descriptions, projects or other survey products?
5. Is it a geodetic survey?
6. Does it establish, reestablish or replace boundaries or geodetic control monuments or reference points?
7. Does it locate, relocate, establish, reestablish or retrace any property lines or boundaries for any tract of land, road right of way or easement?
8. Was it a survey for the division or subdivision of a tract of land or the consolidation of tracts of land?
9. Did it involve locating and laying out alignments, positions or elevations for the construction of fixed works?
10. Did it involve performing or offering to perform any investigation, interpretation or evaluation of, or any consultation or testimony about any of the services described above?
11. Did it involve the collection, preparation, manipulation or modification of data related to any of the services described above, other than acting as a scrivener?
12. Did it fall within the new definition of photogrammetric mapping?
13. Did it result in surveys involving horizontal or vertical mapping control or geodetic control?

If the answer to one or more of the above questions was yes, then the act or acts performed may fall within the new definition of the practice of land surveying. However, new exemptions were added to ORS 672.060, and if the act or acts fall within any of these exemptions, the act would likely be exempt from being regulated as the practice of land surveying.

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Geospatial Checklist

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1. Did the person maintain or transcribe existing georeferenced data into a GIS or LIS format by manual or electronic means and the data are clearly not intended to indicate the authoritative location of property boundaries, the precise shape or contour of the earth or the precise location of fixed works of humans?
2. Did the person perform activities under ORS 306.125 or 308.245 involving transcribing tax maps, zoning maps or other public data records into GIS or LIS formatted cadastre and maintain those cadastre where the data are not modified for other than geographical purposes and the data are clearly not intended to authoritatively represent property boundaries?
3. Did the person prepare maps or compile databases depicting the distribution of natural or cultural resources, features or phenomena and the maps or data are not intended to indicate the authoritative location of property boundaries, or the precise shape or contour of the earth, or the precise location of fixed works by humans?
4. Was the act performed by a federal agency or its contractors in the preparation of military maps, quadrangle topographic maps satellite imagery or other maps that do not define real property?
5. Was the act performed by a federal agency or its contractors in the preparation of documents or databases into a GIs or LIS format, including but not limited to the preparation or transcription of federal census and other demographic data?
6. Was the act performed by a law enforcement agency or its contractor in the preparation of documents or maps for traffic accidents, crime scenes or similar purposes depicting physical features or events or generating or using georeferenced data involving crime statistics or criminal activities?
7. Was the act performed by a peace officer as defined in ORS 161 .015 or fire service professional as defined in ORS 181.610 in conducting, reporting on or testifying about or otherwise performing duties regarding an official investigation?
8. Did the act result in the creation of general maps prepared for private or governmental agencies: (1) for use as guides to motorists, boaters, aviators or pedestrians; (2) for publication in a gazetteer or an atlas as an educational tool or reference publication; (3) for use in the curriculum of any course of study; (4) for use as an illustrative guide to the geographic location of any event (if produced by electronic or print media); or (5) for use as advertising material or user guides (if prepared for conversational or illustrative purposes)?

If the answer to one or more of the above questions is yes, then the act or acts performed may fall within an exemption from regulation of the practice of land surveying. These exemptions were added to ORS 672.060. ◇

AGIC Conference 2007

This year's event will be held at the **Prescott Resort and Conference Center, August 8-10.** Experience GIS at its best this summer in the mile-high city of Prescott, Arizona. Three days of workshops, technical demonstrations, and activities presented by national and local professionals will keep you and your staff current on the latest GIS technologies.

Hands-on Sessions: There are 19 seats available for each hands-on session. To reserve a space, please contact Vivian Gonzales at (623) 773-6416, or vagonzales@lc.usbr.gov

Full conference registration - $200
Single day registration - $130
Student registration - $50

Please note that student registration does not include meals.

For detailed information, visit the conference web site:

http://agic.az.gov/agic2007

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State Cartographer
AGIC Board Member

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AGIC Roundup

• Images for Arizona's portion of the National Agriculture Imagery Project (NAIP) are scheduled to be flown between June and August. The program captures rectified aerial images of crops during the growing season at 1- and 2-meter resolution to support Federal agriculture programs. Arizona will lend its support by capturing ground control points to be used during the flights.

• The workgroups of the Administration and Legal Committee are dealing with several major items: developing the AGIC Work Plan; revising the AGIC Strategic Plan; reviewing the executive order that gave rise to AGIC to determine whether changes are needed; and working with the Arizona Professional Land Surveyors on the subject of defining GIS and surveying activities.

• The Data Resources Committee is compiling a catalog of GIS data holdings and their status. A survey will be conducted at the AGIC conference in August to help prioritize the existing data themes.

• The Executive Forum Working Group, a subcommittee within the Outreach Committee, hopes to speak at the upcoming League of Arizona Cities and Towns Conference. The group has submitted a white paper to the League's Conference Committee. The event takes place in Scottsdale, August 28-31.

Calendar of Events

GITA Surveying / GIS Discussion Meeting
July 13, 2007
City of Peoria Council Chamber
8401 W. Monroe St., Peoria

Tucson Area GIS Cooperative Meeting
July 17, 2007
3:00 - 4:30 PM
City Information Technology Dept. - Pueblo Room
481 W. Paseo Redondo , Tucson
http://www.tucsonaz.gov/gis

AGIC Annual GIS Conference
August 8-10, 2007
Prescott Resort & Conference Center
1500 Highway 69, Prescott
http://agic.az.gov/agic2007

AGIC Quarterly Board Meeting
August 9, 2007
To be held at the AGIC conference in Prescott.
http://agic.az.gov/board/meetings.htm

Workshop: Designing Wildlife Corridors with GIS
September 10, 2007
8:00AM-4:30PM
BLM National Training Center
9828 N 31st Ave, Phoenix
Cost: $100
http://www.blm.gov/ntc/st/en.html
The workshop is limited to 25 participants. To register for the Sept. 10th workshop in Phoenix, please contact Nicole Brown, GIS Program Supervisor, at nbrown@azgfd.gov or (602) 789-3609.

The Arizona Game and Fish Department is sponsoring a full-day workshop featuring CorridorDesigner, a free set of ArcGIS tools developed to assist conservation planners in designing multiple-species wildlife corridors between defined wildland blocks. The workshop will provide an overview of current ecological knowledge and practice regarding corridor design, and demonstrate the use of the ArcGIS tools for designing corridors for real species in real landscapes.
www.corridordesigner.org